

Comparison of Air Quality During Two Winter Episodes



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California Regional PM_{2.5}/PM₁₀ Air Quality Study (CRPAQS)

- Monitoring in central and northern California for 14 months (December 1999 through February 2001)
- Integrated effort
 - Air quality and meteorological measurements (100 monitoring locations, 500 instruments, 600 parameters)
 - Emissions characterization
 - Data analysis and modeling

CRPAQS Monitoring Sites

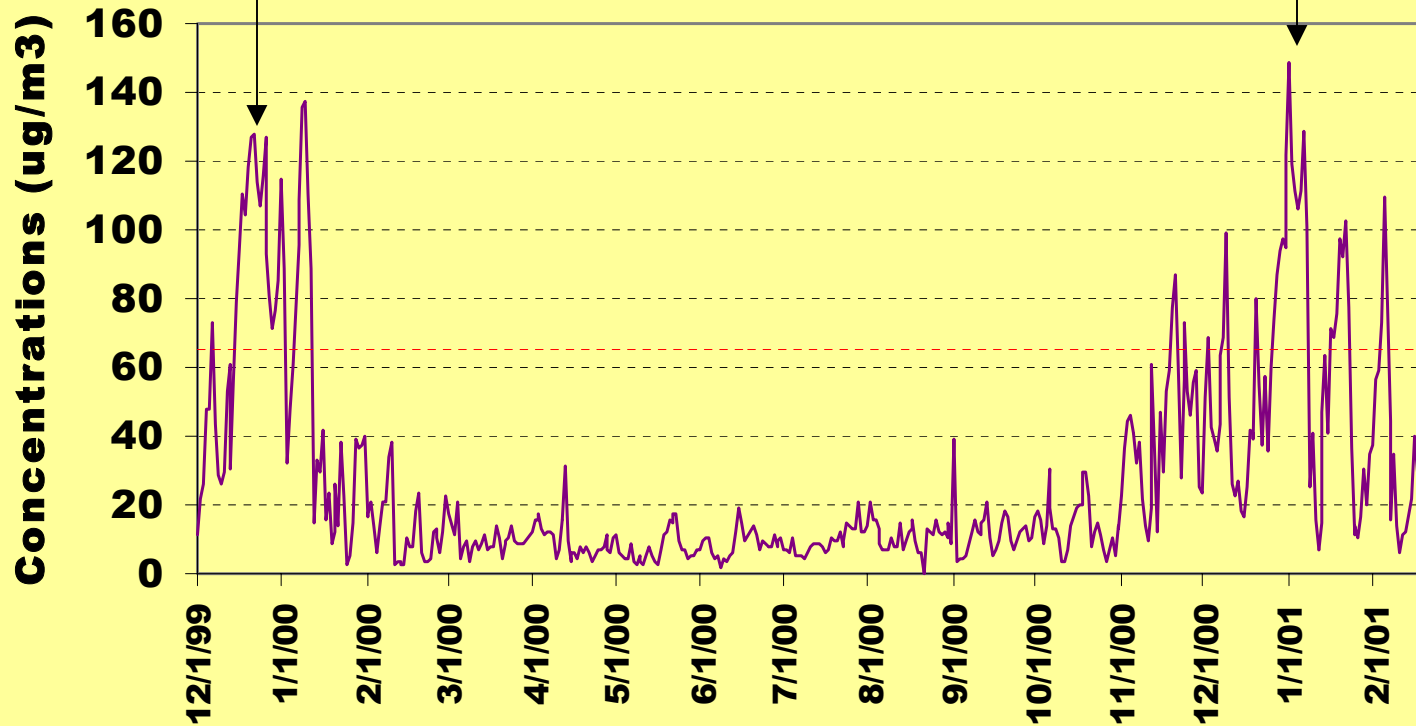


PM2.5 Concentrations

Fresno

Dec 99

Dec 00/Jan 01



Episode Comparison

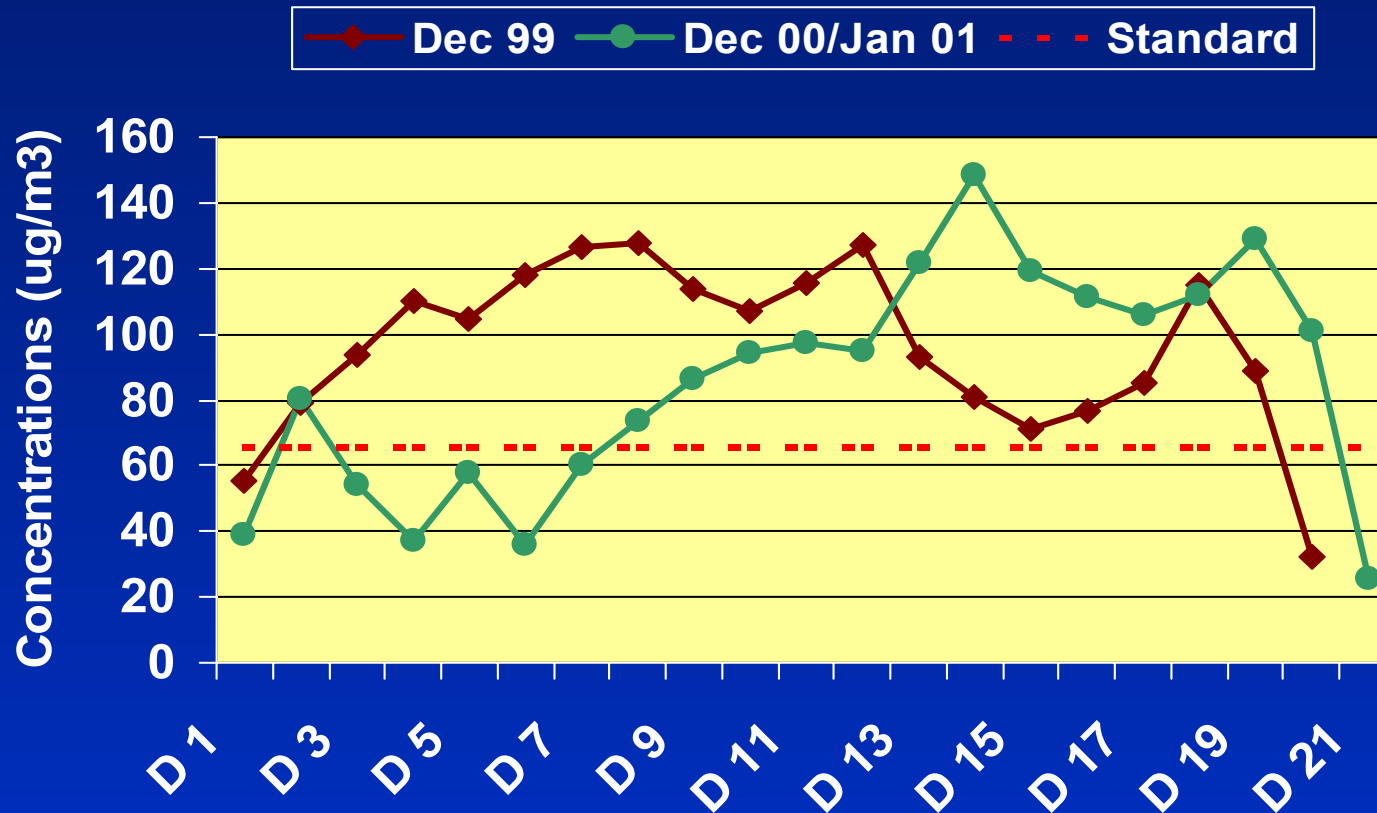
- Episode duration and strength
- Spatial and temporal patterns
- Chemical composition
 - Dominant components
 - Variations among sites and episodes

Duration and Strength

- Duration
 - December 99 (12/14/99-1/2/00)
 - December 00/January 01 (12/19/00-1/8/01)
- Days above standard
- Maximum concentrations
 - Episode maximum
 - Spatial variations

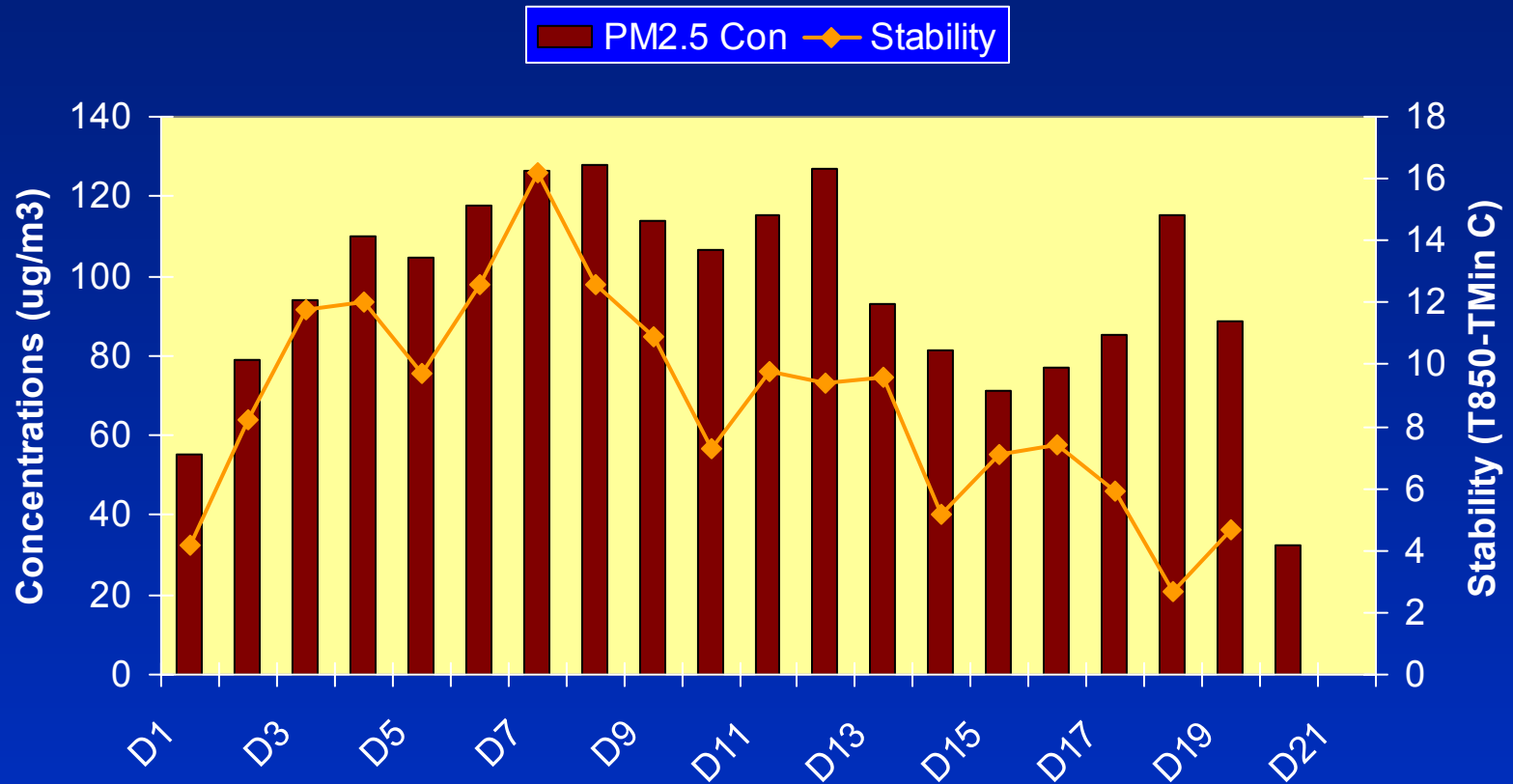
Episode Duration

PM2.5 Mass - Fresno



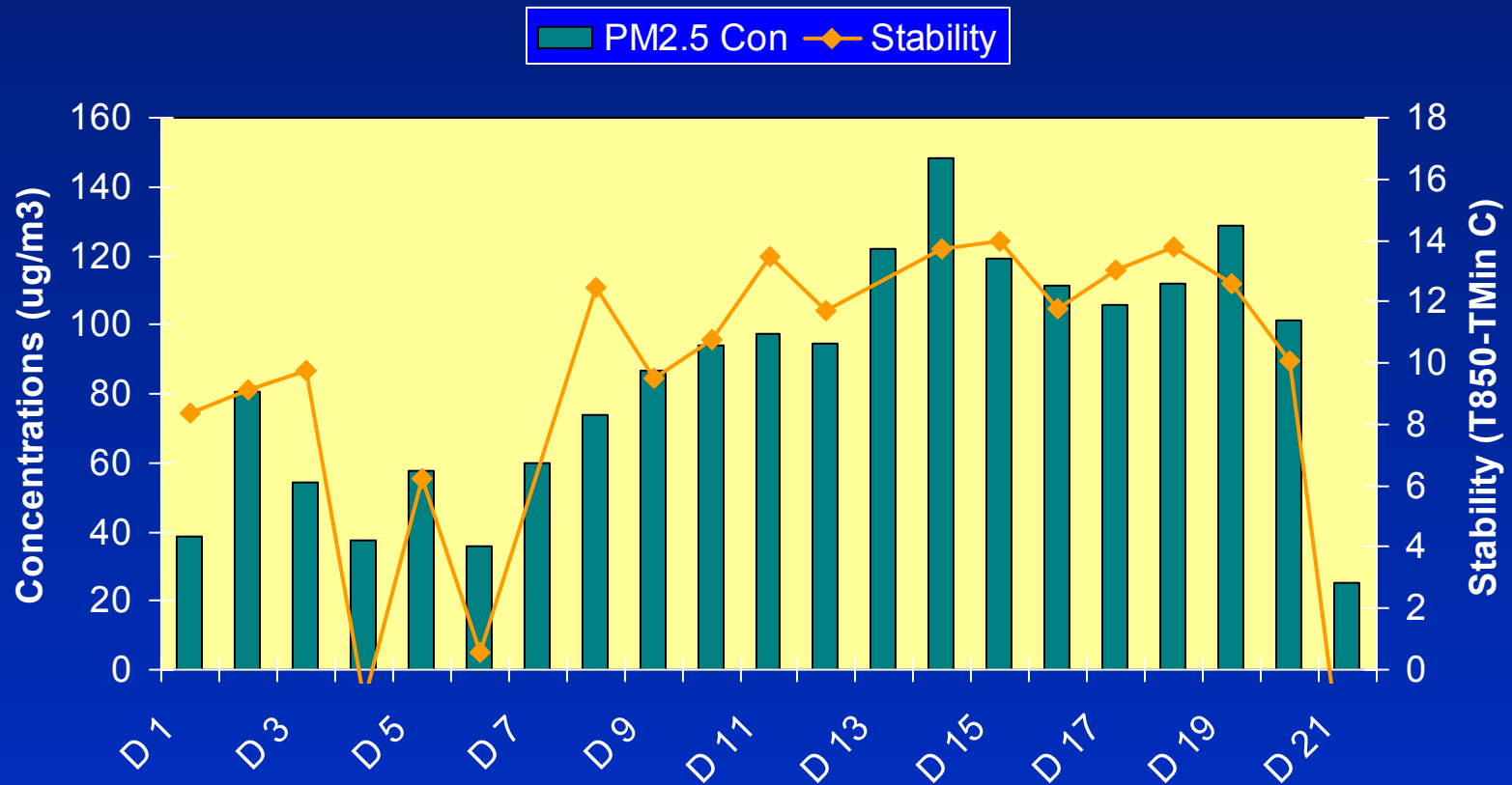
December 1999 Episode

Atmospheric Stability and PM2.5 Concentrations



December 2000/January 2001 Episode

Atmospheric Stability and PM2.5 Concentrations



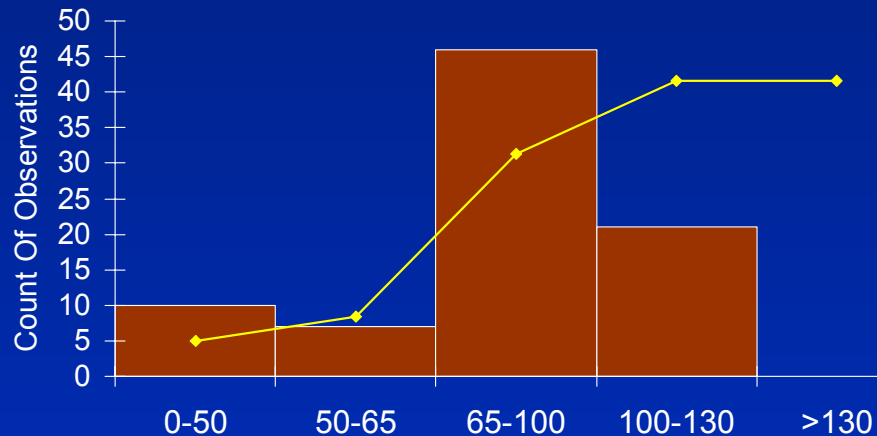
Episode Strength

	Dec 99	Dec 00/Jan 01
Days Above PM2.5 24-hr NAAQS	18	15
Days Above PM2.5 2 x 24-hr NAAQS	0	5
Max PM10	174 ug/m3	208 ug/m3
Max PM2.5	129 ug/m3	179 ug/m3

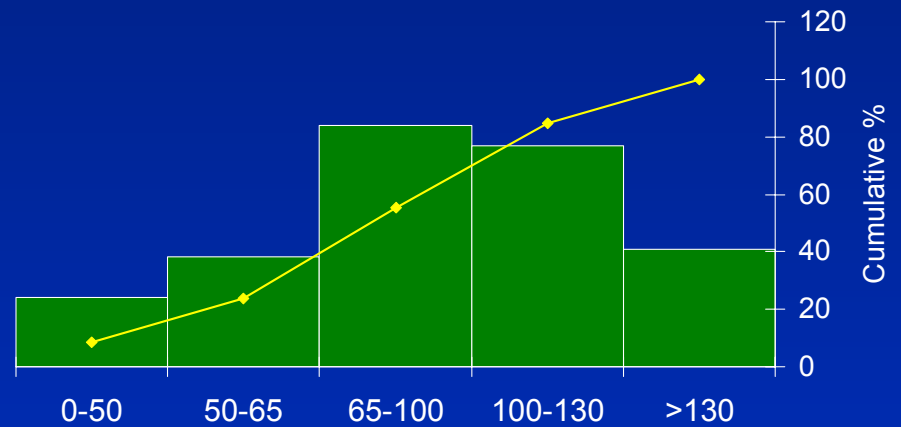
Episode Strength

PM2.5 Concentrations Community Sites

December 1999



Dec 2000/Jan 2001

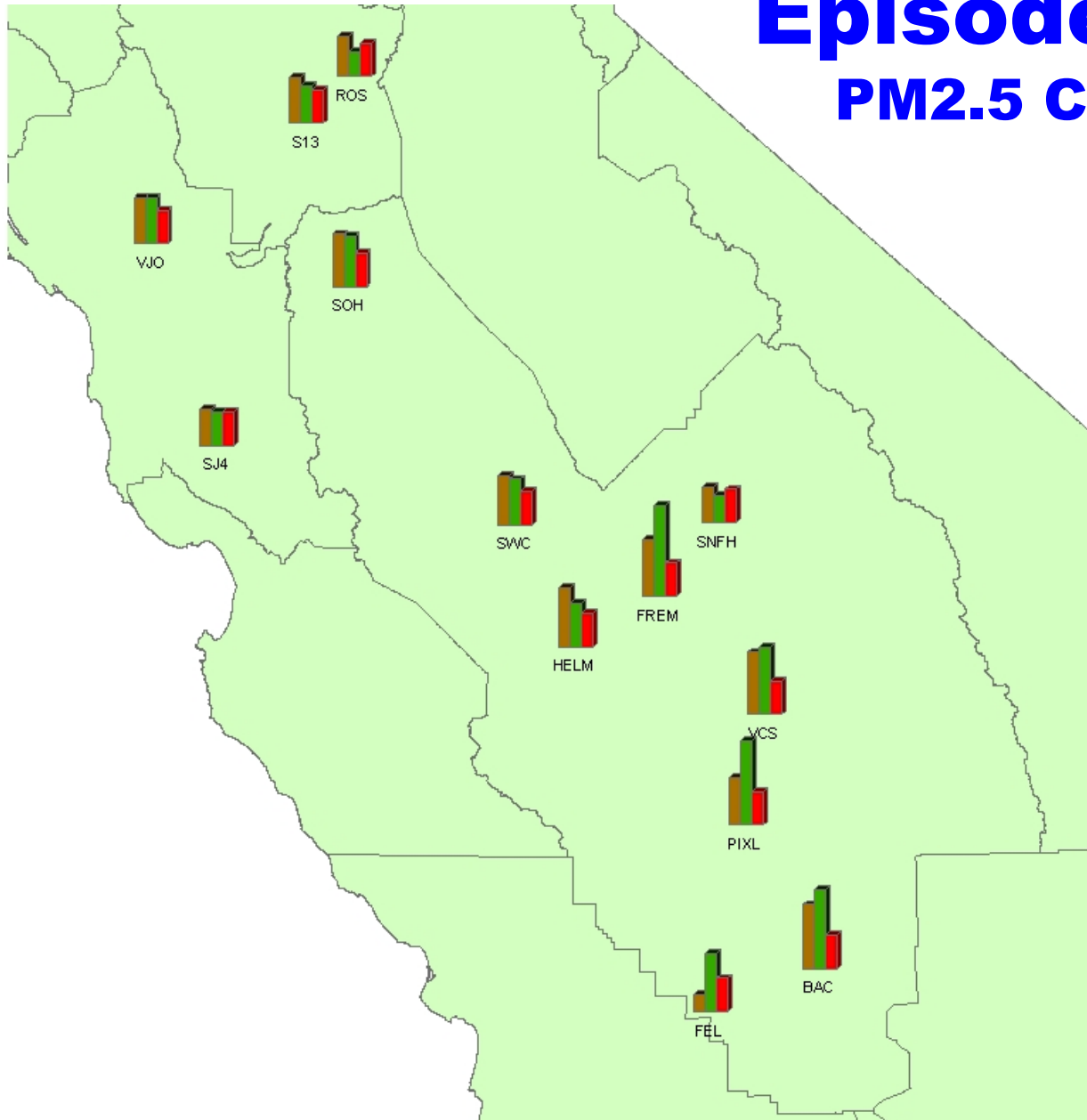


Concentration Range in $\mu\text{g}/\text{m}^3$

Spatial and Temporal Patterns

	Dec 99	Dec 00/Jan 01
Extent	Northern and central SJV	Central and southern SJV
Spread	North to south	South to north
Buildup	Rapid	Slow

Episode Maximum PM2.5 Concentrations





PM2.5 Episode Peaks



Spread of Pollution

Dec 99 - Southward spread

<div>  North </div>	Site	12/14/99	12/20/99	12/26/99	1/1/00
	SOH	13.2	103.2	71.0	28.0
	M14	22.1	92.5	97.7	40.6
	SWC	17.1	87.4	97.4	17.9
	FSF	55.4	126.6	93.2	88.8
	COP	18.9	76.8	106.6	75.3
	PIXL		66.7	92.2	44.4
<div>  South </div>	BAC	22.5	78.1	78.6	36.7

PM2.5 Concentrations:

	< 65 ug/m ³
	65-85 ug/m ³
	> 85 ug/m ³

Dec 00/Jan 01 - Northward spread

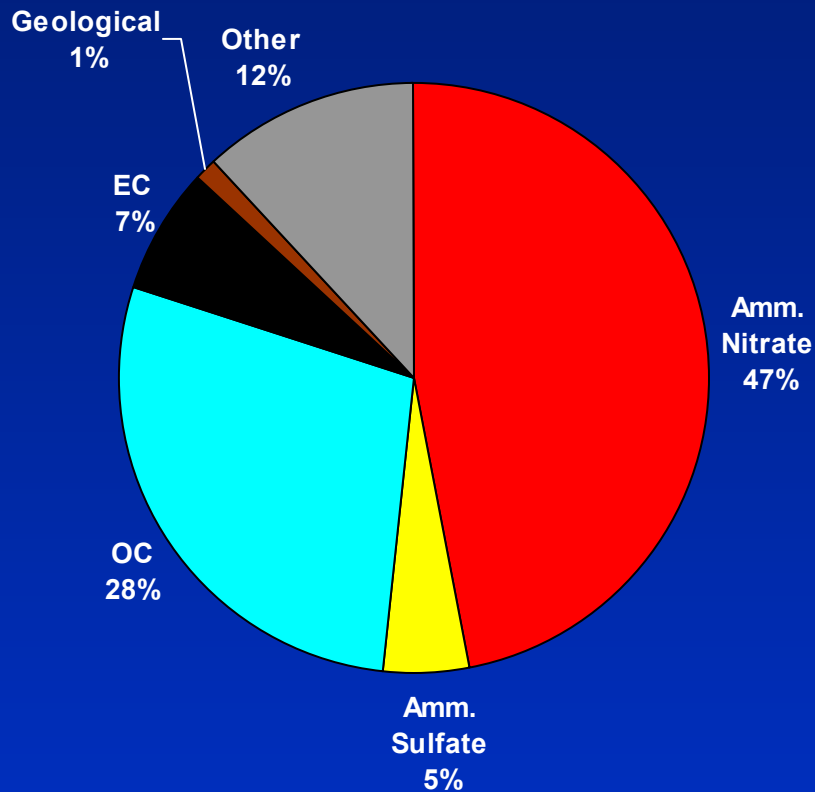
<div>  North </div>	Site	12/26/00	1/1/01	1/4/01	1/6/01
	SOH	31.9	57.0	62.9	99.6
	M14	59.8	71.9	80.8	100.6
	SWC	21.2	44.5	49.5	89.7
	FSF	73.9	148.3	105.9	128.7
	COP	31.0	62.8	98.8	145.0
	PIXL	31.0	81.4	126.8	164.9
<div>  South </div>	BAC	62.6	132.7	127.3	137.7

Chemical Composition

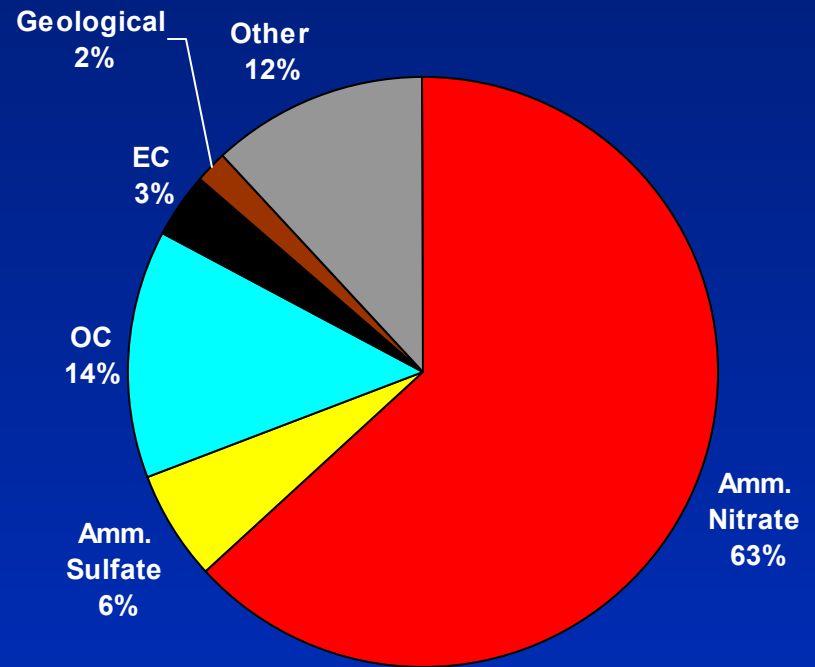
- Dominant components
- Variations
 - Urban sites versus rural
 - Among urban sites
 - Bakersfield versus Fresno

Chemical Composition

Average Urban and Rural Exceedance



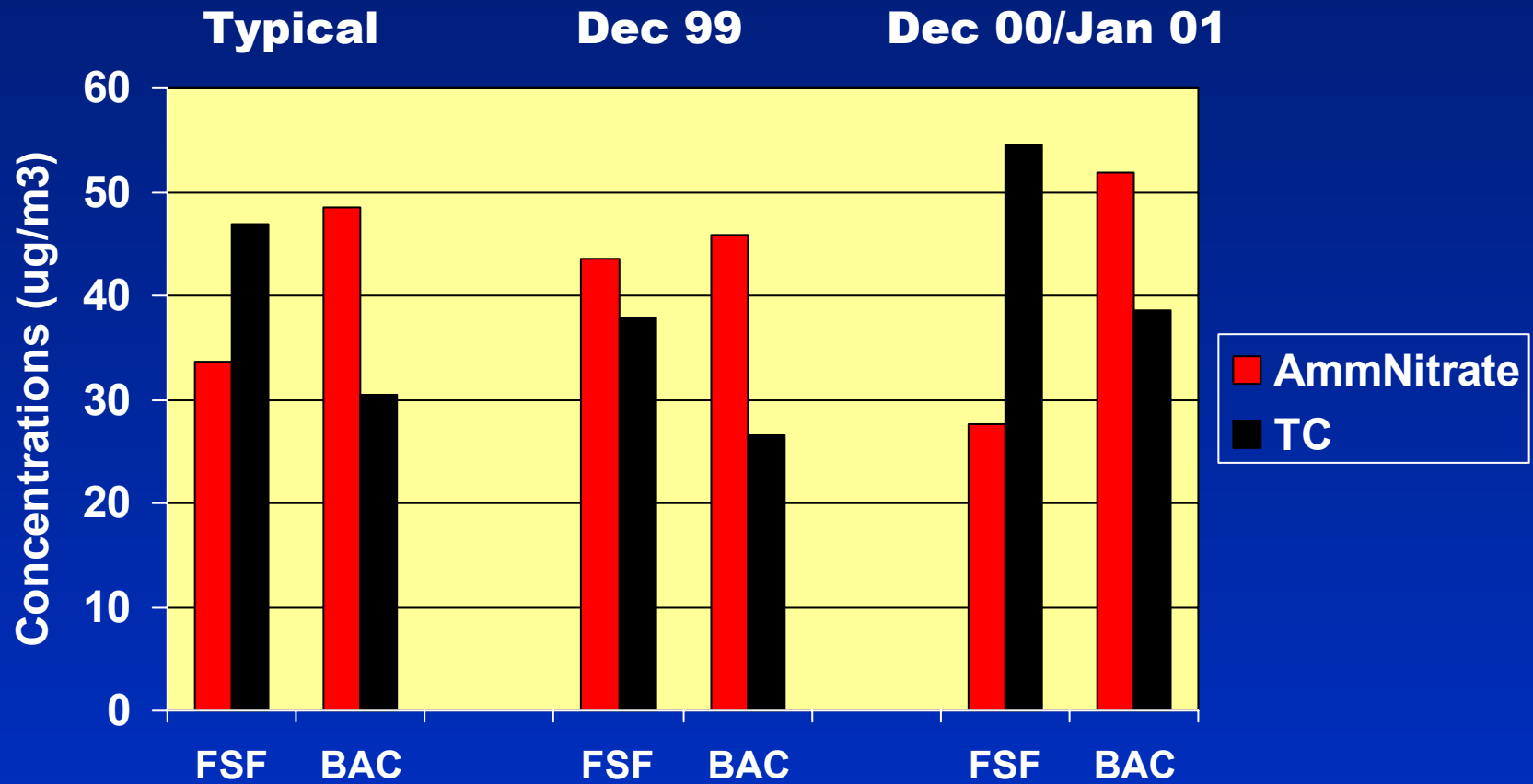
Urban



Rural

Chemical Composition

Variations Among Urban Sites



Conclusions

- Each episode is unique
 - Spatial and temporal patterns
 - Strength and duration
- Ammonium nitrate and total carbon comprise over 80% of PM_{2.5} mass
 - Rural sites: ammonium nitrate > carbon
 - Urban sites: vary among sites and episodes